

Wake Turbulence Safety Briefing

3-C



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This appendix contains a paper copy of view foils with descriptive words for each foil that can be used for a classroom presentation. The briefing supports a classroom discussion of the Pilot and Air Traffic Controller Guide and/or the video.

WAKE TURBULENCE SAFETY BRIEFING

Wake-turbulence accidents continue to happen even though basic information about the hazard as well as avoidance procedures have been available for air traffic controllers and pilots for many years. National Transportation Safety Board (NTSB) data show that between 1983 and 1993, there were at least 51 accidents and incidents in the United States that resulted from probable encounters with wake turbulence. The Aviation Safety Reporting System (ASRS) had 447 incidents attributed to wake turbulence reported from January 1986 to March 1994.



Figure 1

WAKE TURBULENCE SAFETY BRIEFING

A Cessna Citation 550 crashed while on a visual approach. Two crewmembers and six passengers were killed. Witnesses reported that the aircraft suddenly and rapidly rolled left and then contacted the ground while in a near-vertical dive. The Citation was about 2.78 nautical miles behind a Boeing 757.

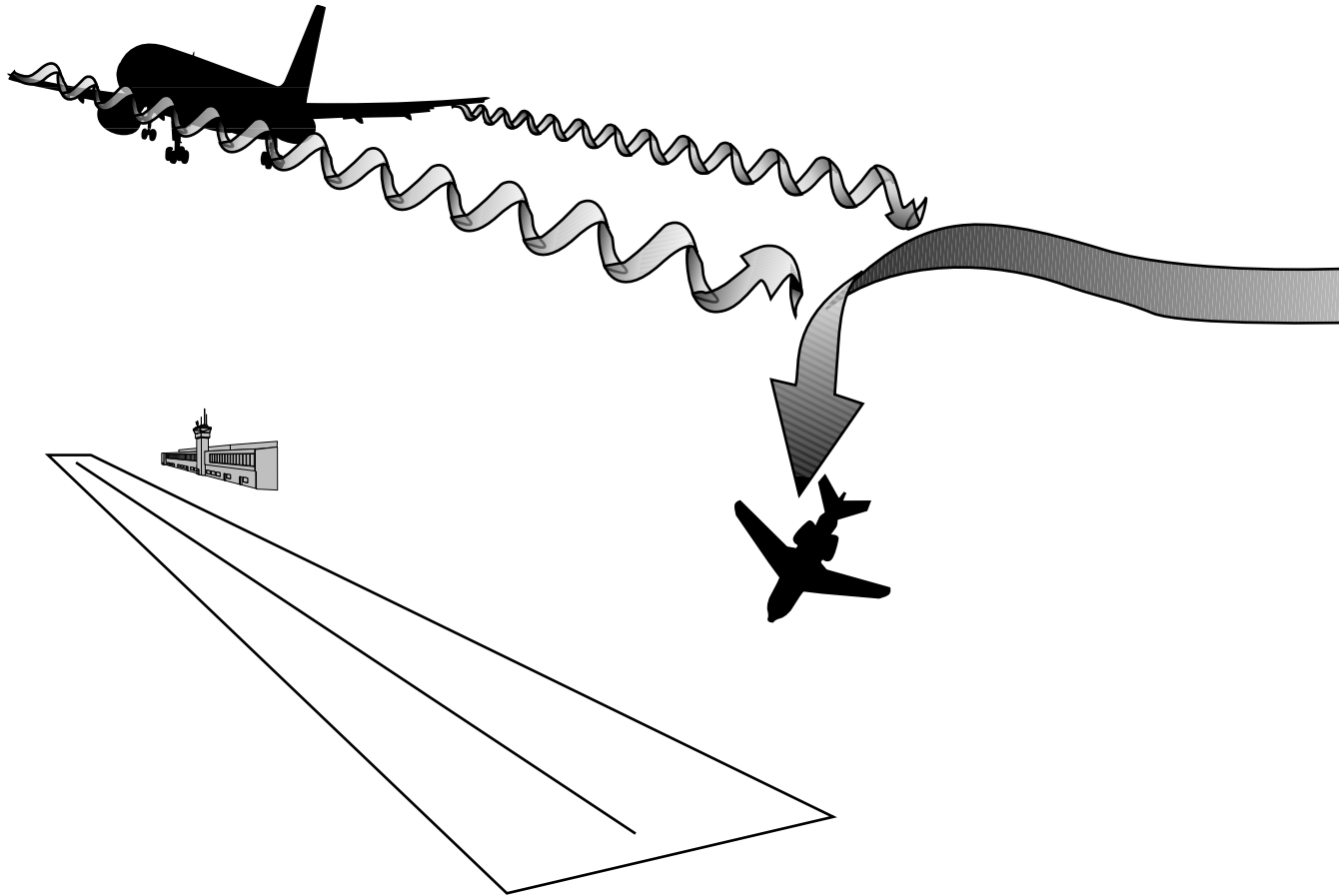


Figure 2

WAKE TURBULENCE SAFETY BRIEFING

A Gulfstream IV departed on a routine night trip. The weather was clear with unlimited visibility and smooth air. During a slow descent for landing at approximately Flight Level 250, ATC advised the pilot that he might see traffic crossing from right to left. The Gulfstream sighted the traffic far ahead. At about 15,000 feet and 300 knots, the Gulfstream pilot reported that he “felt like he had hit a 20 foot thick concrete wall at 300 knots.”

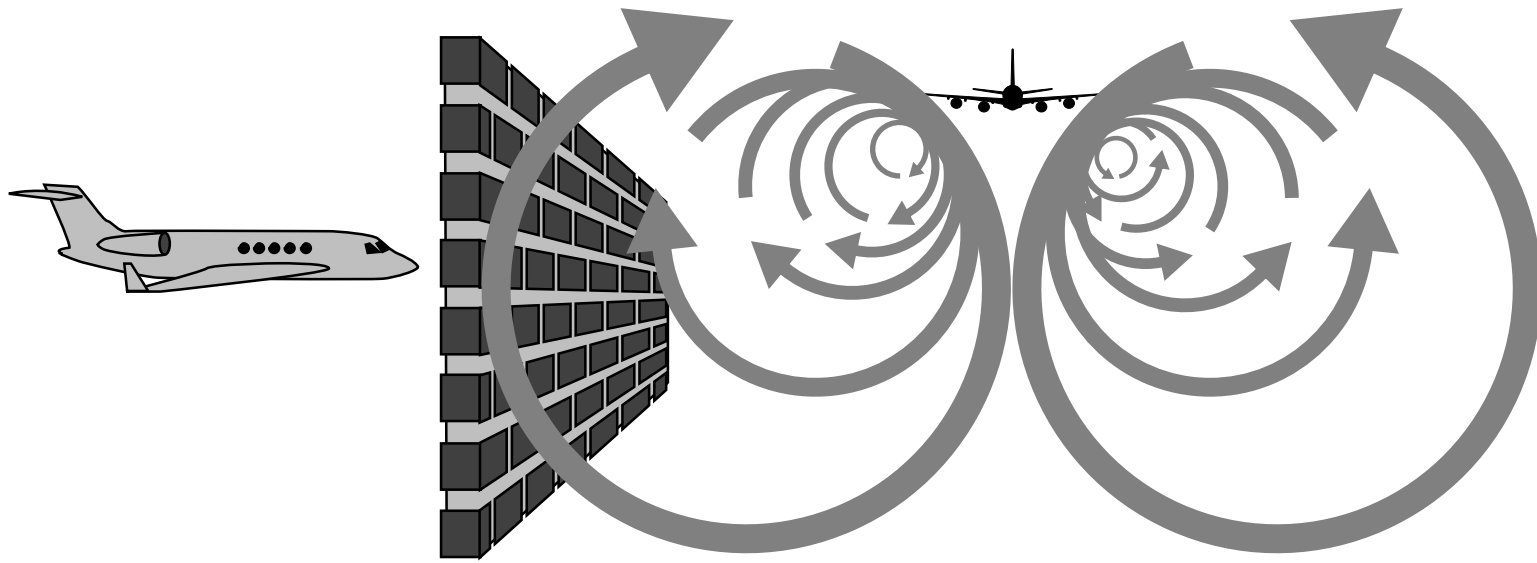


Figure 3

WAKE TURBULENCE SAFETY BRIEFING

A medium size transport was told to expedite the takeoff behind a large transport. The medium transport began its take-off roll as the large transport rotated. The large transport departed straight ahead. The medium transport started a turn at 300 feet AGL using 15 degrees of bank angle. Suddenly and violently the bank angle increased to 30 degrees apparently from the wake turbulence created by the large transport.



Figure 4

WAKE TURBULENCE SAFETY BRIEFING

Investigation of the most recent accidents involving wake turbulence by the National Transportation Safety Board (NTSB) indicates, that, while the aviation and scientific communities have a comprehensive understanding of wake turbulence, there is still a need for more information. The NTSB also found that pilots are not sufficiently knowledgeable of wake-turbulence and avoidance procedures. Additionally, there are inadequacies in air traffic control procedures related to visual approaches and visual flight rules operations behind heavier aircraft.

NTSB:

“...Insufficient pilot knowledge and training related to the avoidance of wake vortices”

“...not provided adequate training related to the movement and avoidance of wake vortices...”

“...Current air traffic control procedures and pilot reactions can result in aircraft following too closely...while on a visual approach to landing”

WAKE TURBULENCE SAFETY BRIEFING

In this presentation, we are going to look at what every pilot and air traffic controller should know to avoid wake turbulence encounters.

We'll look at:

- the description, formation and characteristics of wake turbulence
- air traffic controllers and pilot responsibilities for avoiding the hazard
- visual avoidance procedures
- the problems pilots face in visually maintaining separation from wake turbulence
- some pilot techniques for visually avoiding wake turbulence
- what pilots can expect during an inadvertent encounter with wake turbulence
- air traffic control considerations when applying separation standards

What pilots and air traffic controllers should know about wake turbulence:

- **What it is**
- **Who is responsible for avoidance and when**
- **Visual avoidance procedures**
- **Separation difficulties**
- **Avoidance techniques for pilots**
- **Effects of inadvertent encounters**
- **ATC considerations**

WAKE TURBULENCE SAFETY BRIEFING

The phenomenon that creates wake turbulence results from the forces that lift the aircraft. High pressure air from the lower surface of the wing flows around the wingtips to the lower pressure region above the wings. This pressure differential triggers the roll-up of airflow aft of the wing resulting in counter-rotating air masses trailing downstream of the wingtips.

The wake turbulence associated with helicopters results from the high pressure air on the lower surface of the rotor blades flowing around the tips of the rotor blades to the lower pressure region above the rotor blades.

Since wake turbulence dissipates more rapidly in ground effect, the turbulence level is reduced, but still may be a factor in the touchdown areas.

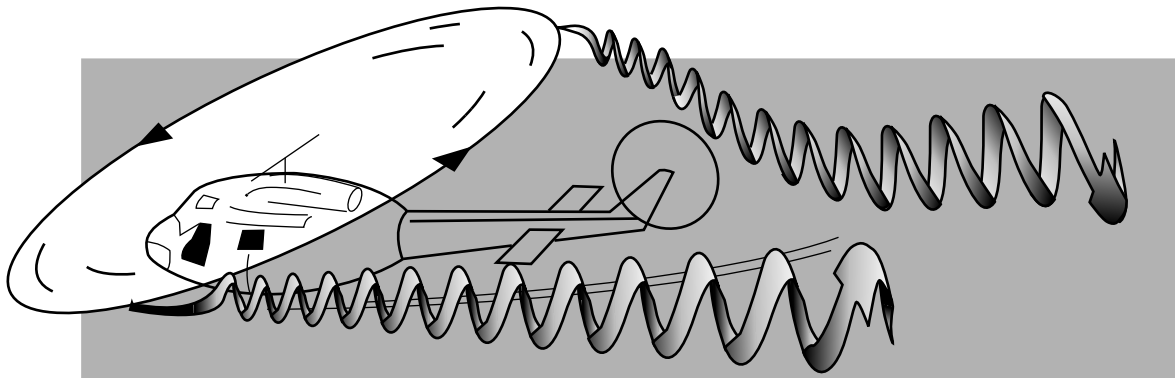
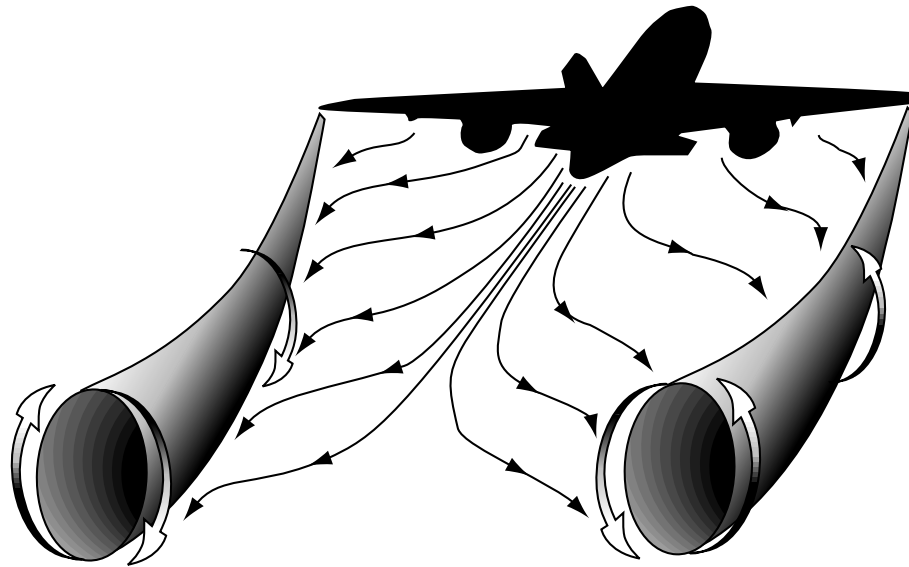


Figure 7

WAKE TURBULENCE SAFETY BRIEFING

The strength of the wake turbulence is governed by the weight, flight speed, and wingspan of the aircraft. Aircraft weight is the predominant factor.

The greatest wake turbulence strength occurs when the generating aircraft is heavy, in a clean-wing configuration, and flying at slow airspeed.

Aircraft are grouped into categories based upon gross weight. Longitudinal distance intervals between aircraft for each category are used to provide safe wake-turbulence separation criteria.

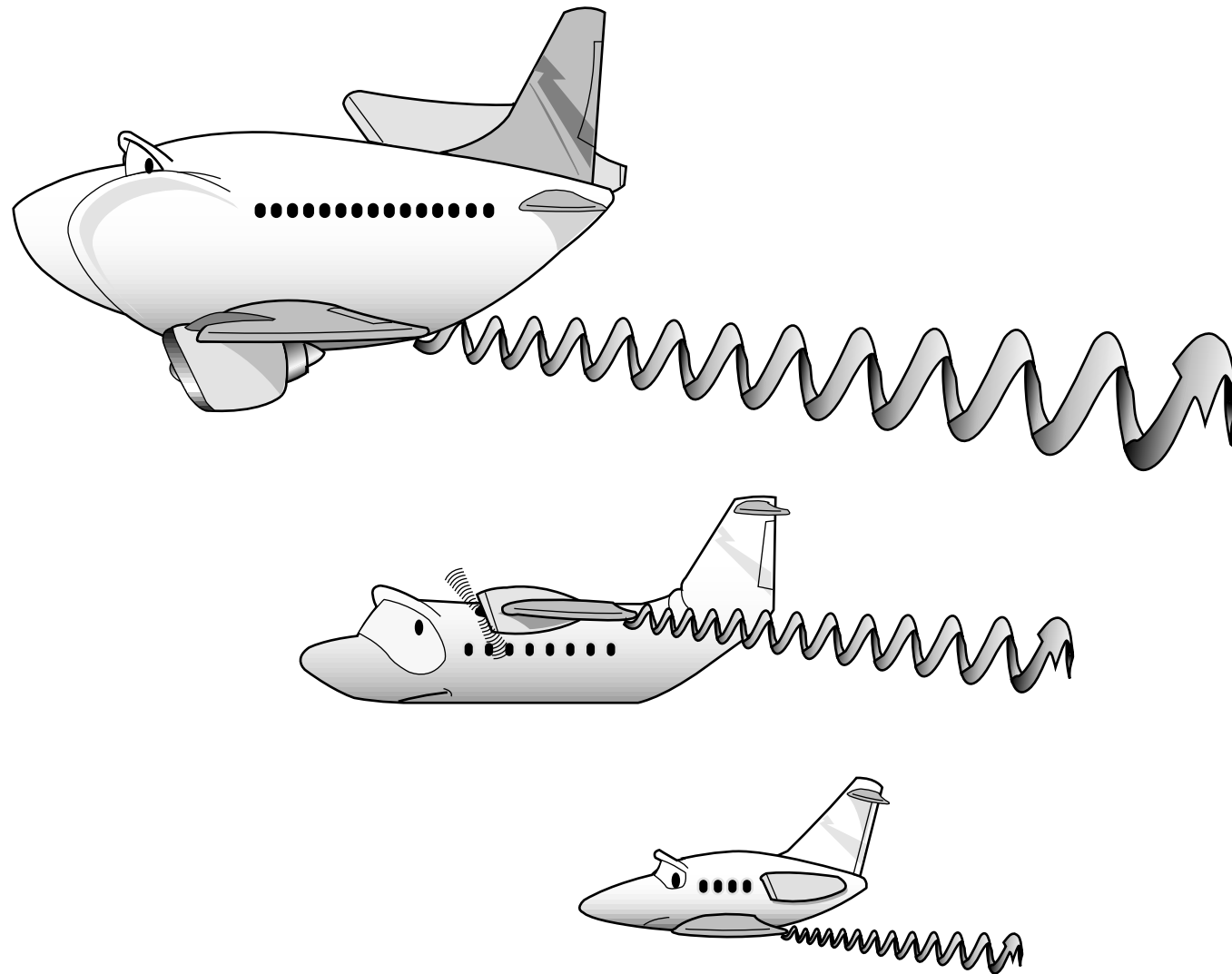


Figure 8

WAKE TURBULENCE SAFETY BRIEFING

Wake turbulence is generated from the moment aircraft leave the ground since it is a function of aircraft lift. At altitude, the two vortices begin to sink at a rate 300 to 500 hundred feet per minute for about 30 seconds. The rate then decreases and eventually approaches 0 at between 500 and 900 feet below the flightpath of the generating aircraft. Horizontal motion is dictated by the ambient wind and proximity to the ground.

At altitude, the wake's horizontal motion is determined by the velocity of the crosswind.

When the aircraft is near the ground on approach or takeoff, the wake descends below the flightpath until it enters ground effect. The two vortices then slow their downward descent and begin to move laterally. With no crosswind, the two vortices move apart at a height of about 60 feet AGL. Crosswinds greater than 6 knots cause the vortices to move quickly across the flightpath and to breakup rapidly.

Vortices have been found to move laterally in ground effect as much as 1500 feet under certain conditions.

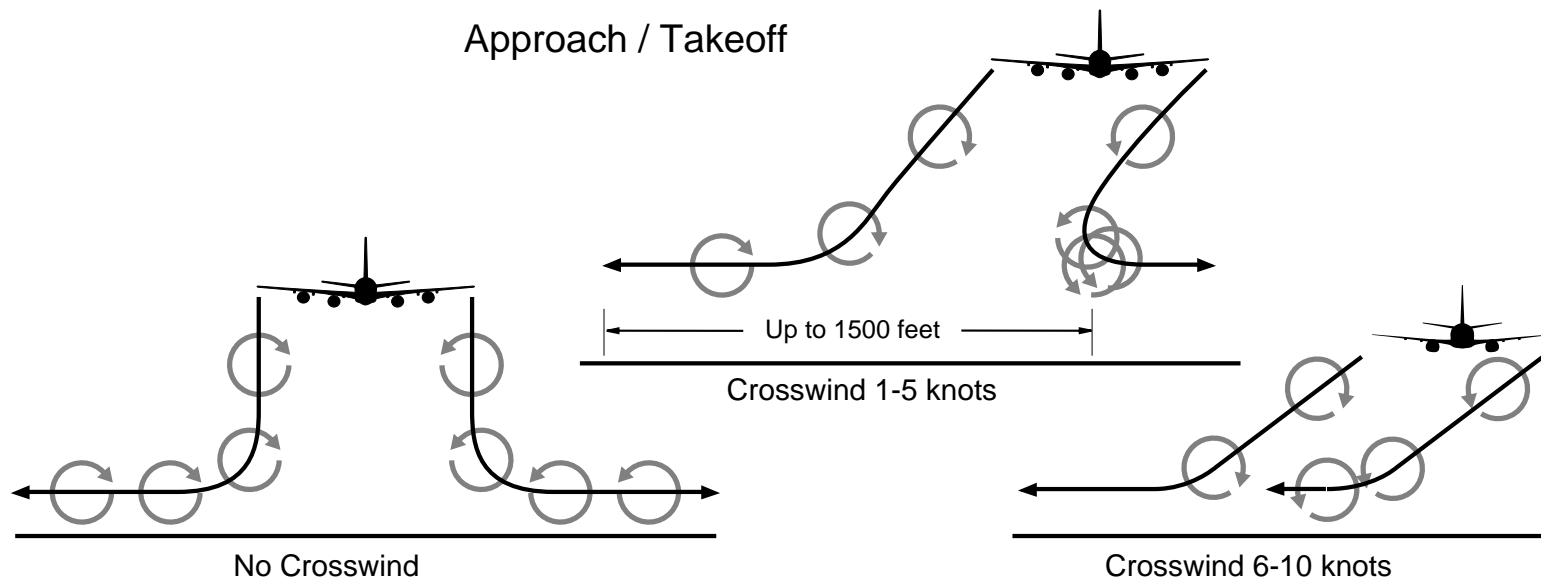
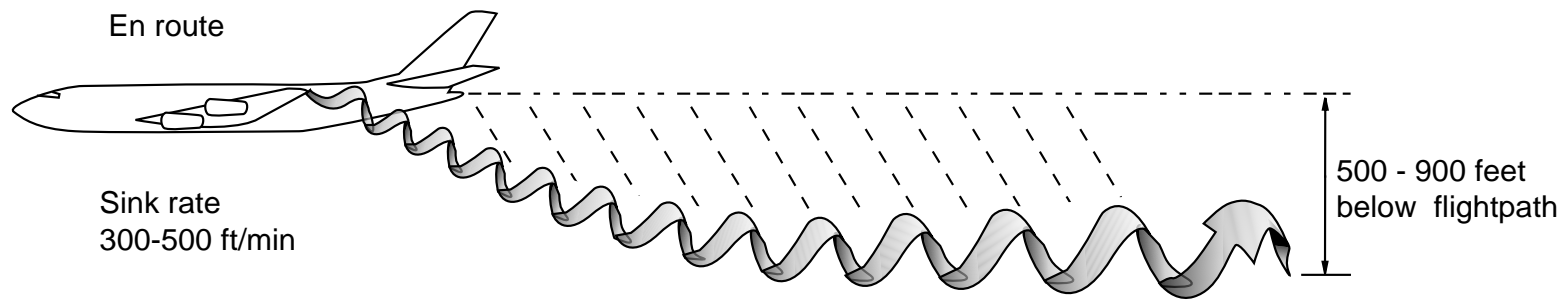


Figure 9

WAKE TURBULENCE SAFETY BRIEFING

The decay process of the wake is complex and is strongly influenced by atmospheric conditions. Normal turbulence and the internal circular motion of the vortex extracts energy. Sometimes, a small amount of turbulence in the atmosphere can also cause the two vortices to join which quickly dissipates their strength.

The wake will retain its strength longer in calm wind conditions.

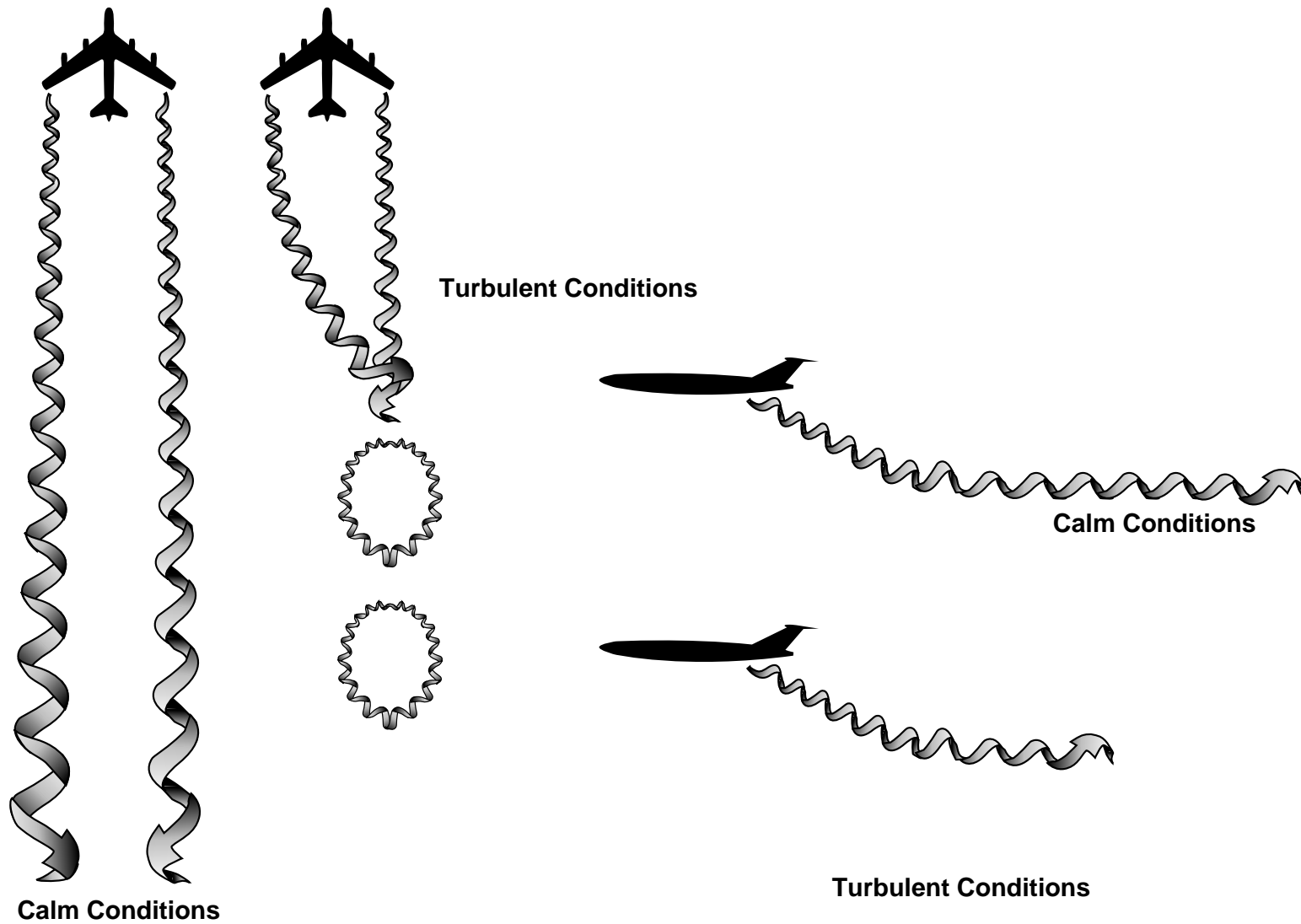


Figure 10

WAKE TURBULENCE SAFETY BRIEFING

Pilots and air traffic controllers share in the responsibility for assuring that aircraft avoid wake turbulence.

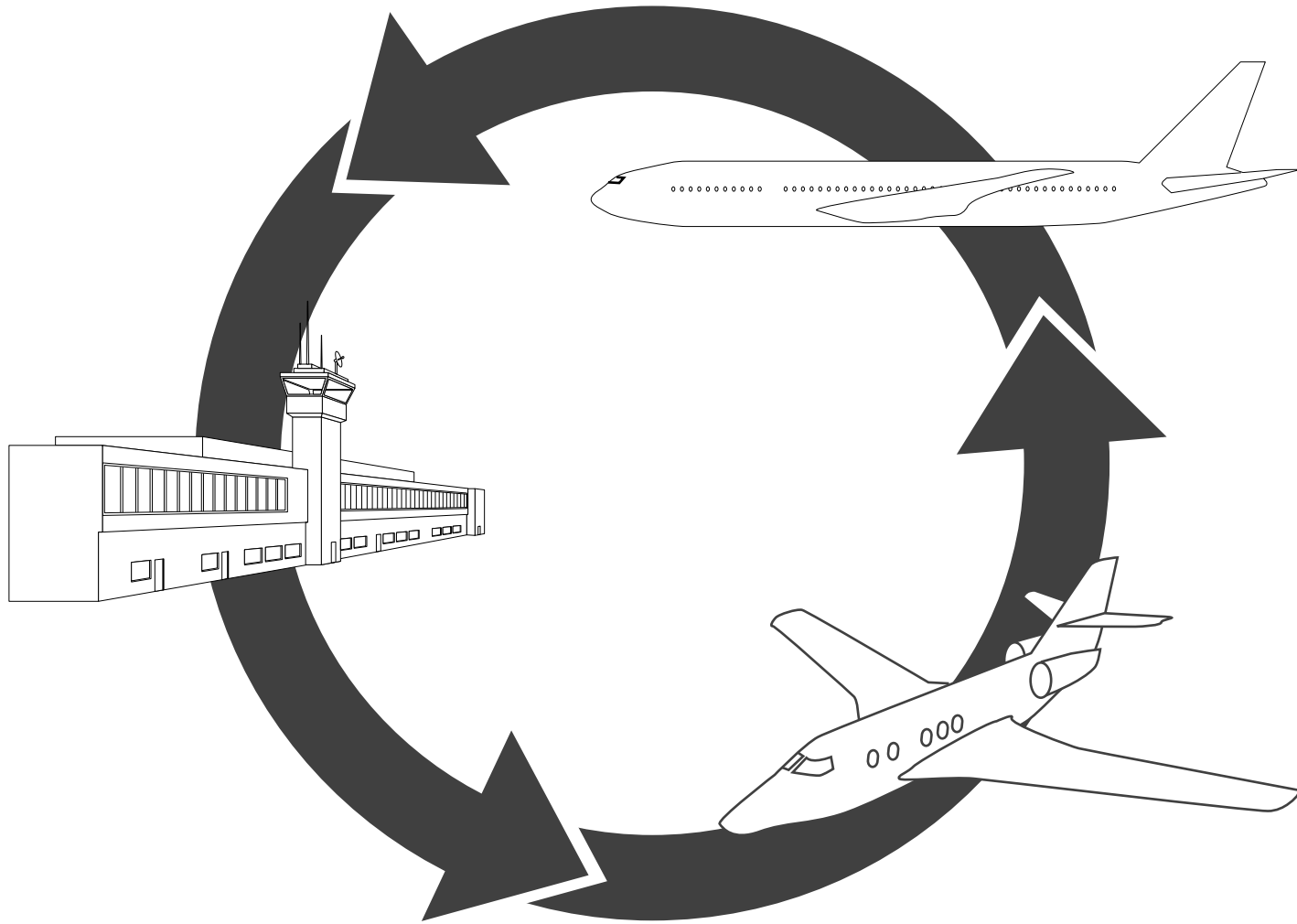


Figure 11

WAKE TURBULENCE SAFETY BRIEFING

When providing radar service to the aircraft, air traffic controllers apply wake-turbulence longitudinal separation distances between IFR aircraft and to VFR aircraft in some terminal areas. The amount of distance between aircraft is dependent on the weights of the aircraft. This is because aircraft weight is a major factor in producing the strength of the wake turbulence. The distance between aircraft allows time for the wake turbulence to descend below the flightpath of the leader aircraft and begin to dissipate. Controllers are required to maintain this minimum radar controlled separation until the pilot accepts visual separation or a visual approach for landing.

Tower controllers are responsible for runway separation for arriving or departing the airport; however, tower controllers do not provide visual wake-turbulence separations to arrival aircraft. That is the pilot's responsibility.

Wake turbulence separation for departing aircraft is provided by the tower controller by applying takeoff time intervals between aircraft. The intervals are based upon aircraft weight categories and the runway situation. Distinctions are made for parallel runways separated less than 2500 feet, intersecting runways, or same runway and whether takeoffs are in the same, opposite, or intersecting direction.



Figure 12

WAKE TURBULENCE SAFETY BRIEFING

ATC wake turbulence advisory:

- Air traffic controllers are required to provide a “Caution-Wake Turbulence” advisory when VFR aircraft are not being radar vectored and are behind heavy category jets or B-757s. The caution must also be issued to IFR aircraft that accept visual separation or a visual approach.
- Controllers may issue a caution anytime wake turbulence may have an adverse effect on an aircraft following another aircraft.
- Although not mandatory during ground operations, controllers may use the words, jet-blast, propwash or rotorwash in lieu of wake turbulence, when issuing a caution advisory.

“CAUTION - WAKE TURBULENCE”



Figure 13

WAKE TURBULENCE SAFETY BRIEFING

Pilots are responsible for avoiding wake turbulence:

- when flying in visual flight rules and not being radar vectored
- when maintaining visual separation
- when cleared for a visual approach.

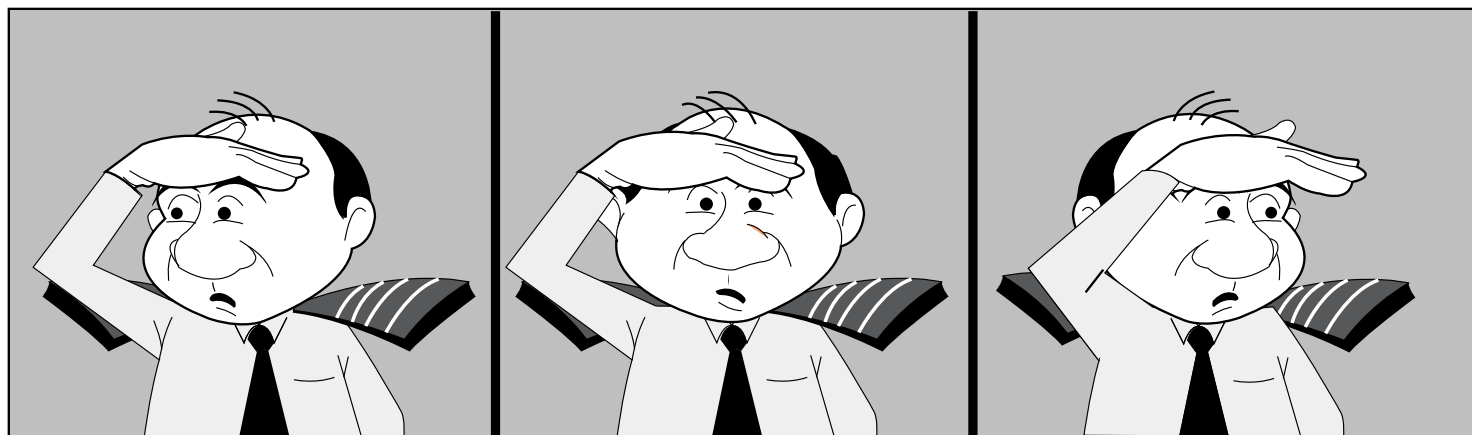
If VMC exist when ATC is providing IFR radar control, the pilot is not relieved of the responsibility for assuring his/her flightpath will avoid an encounter with wake turbulence.

When it is operationally beneficial, ATC may authorize the pilot to conduct a visual approach to an airport or to follow another aircraft in VMC. The pilot must have in sight, the airport or an aircraft identified by ATC as an aircraft to follow during the approach, before the clearance is issued. When the pilot is able to comply and accepts the clearance, he/she also assumes responsibility for avoiding wake turbulence.

The pilot may request a waiver to air-traffic-control imposed wake-turbulence timing separation requirements between takeoffs. If no other traffic conflict exists, the tower controller will then advise the pilot of potential wake turbulence and clear the aircraft for takeoff.

Pilots are also responsible for avoiding wake turbulence during cruise flight VFR, when altitude separation could be as little as 500 feet between IFR and VFR aircraft.

Some aircraft wake-turbulence weight categories require the pilot to identify the aircraft category (i.e., Heavy) when communicating the flight's call sign during radio transmissions.



Visual Flight Rules

Maintaining Visual Separation

Cleared for Visual Approach

Figure 14

WAKE TURBULENCE SAFETY BRIEFING

Pilots must rely on their knowledge of the behavior and characteristics of wake turbulence to visualize its location so that it may be avoided. Avoidance procedures were developed for various situations. These procedures may require you to adjust your normal operations or flightpath. Make sure you consider your aircraft performance when using these procedures.

In general, the recommended avoidance procedures assist the pilot in avoiding the area below and behind the leading aircraft.

During the approach and landing phase, a go-around may be the appropriate solution.

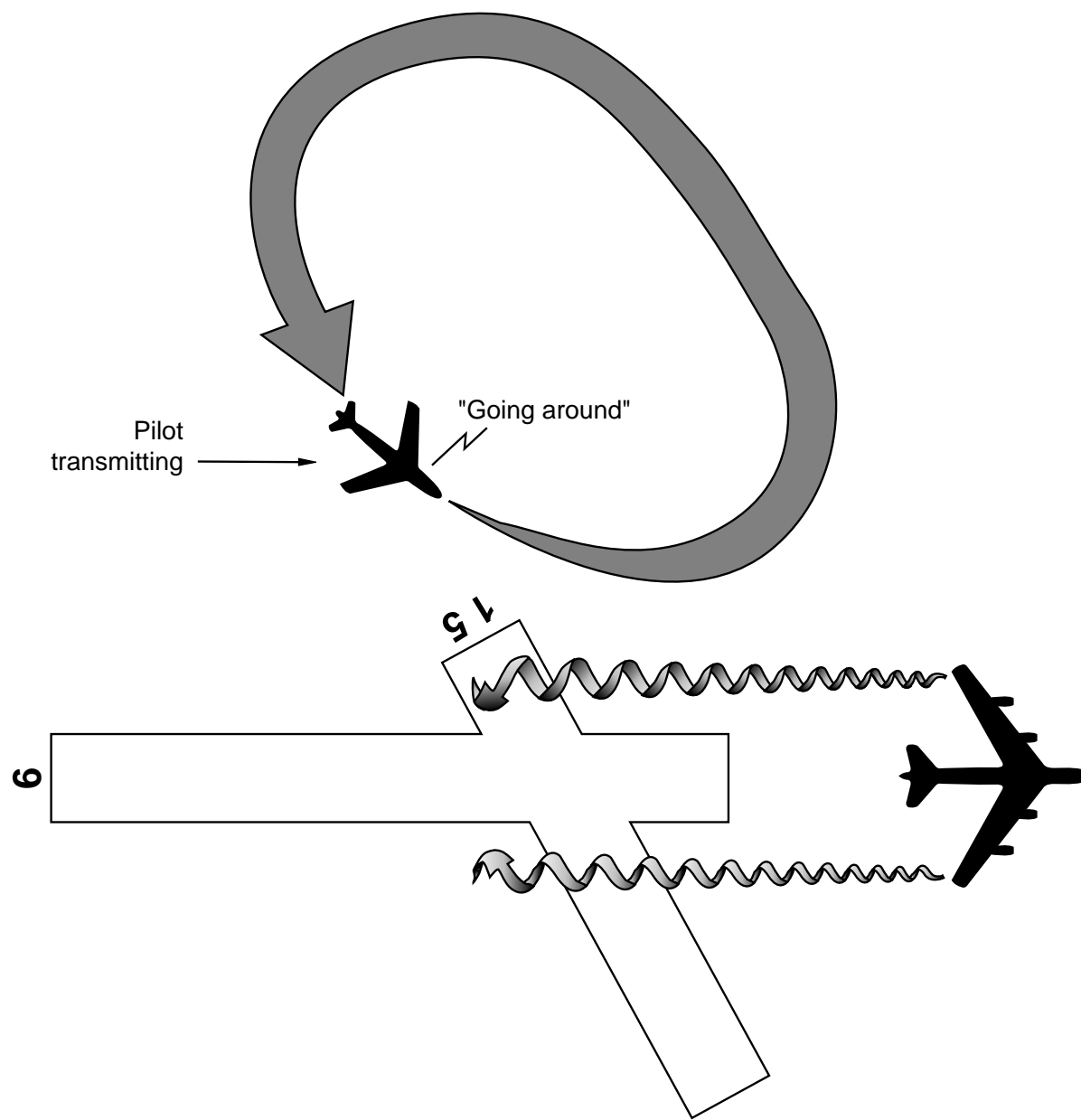


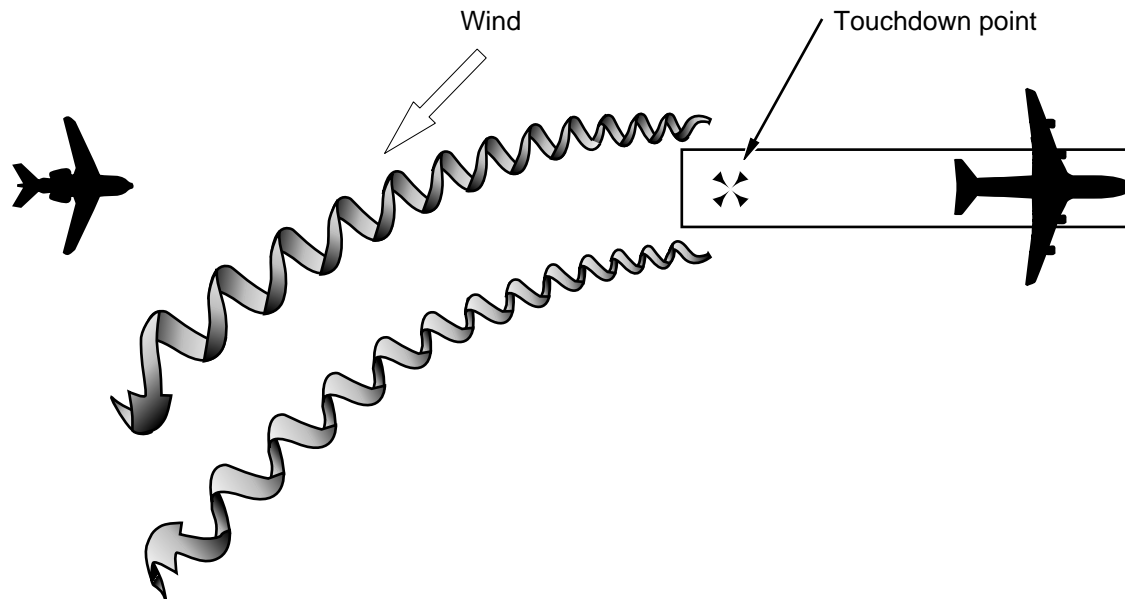
Figure 15

WAKE TURBULENCE SAFETY BRIEFING

Now, let's review the recommended wake-turbulence avoidance procedures for several different flight situations. These procedures are also listed in the Airman's Information Manual and the FAA Advisory Circular on wake turbulence.

The first situation discussed is landing behind a larger aircraft landing on the same runway. Stay at or above the leading aircraft's flightpath and note its touchdown point and land beyond it. Assure that sufficient runway is available for your landing.

Avoidance Procedures: Landing



Same Runway:

Behind a larger aircraft that is using the same runway, fly at or above leader aircraft's final approach flightpath

Note touchdown point

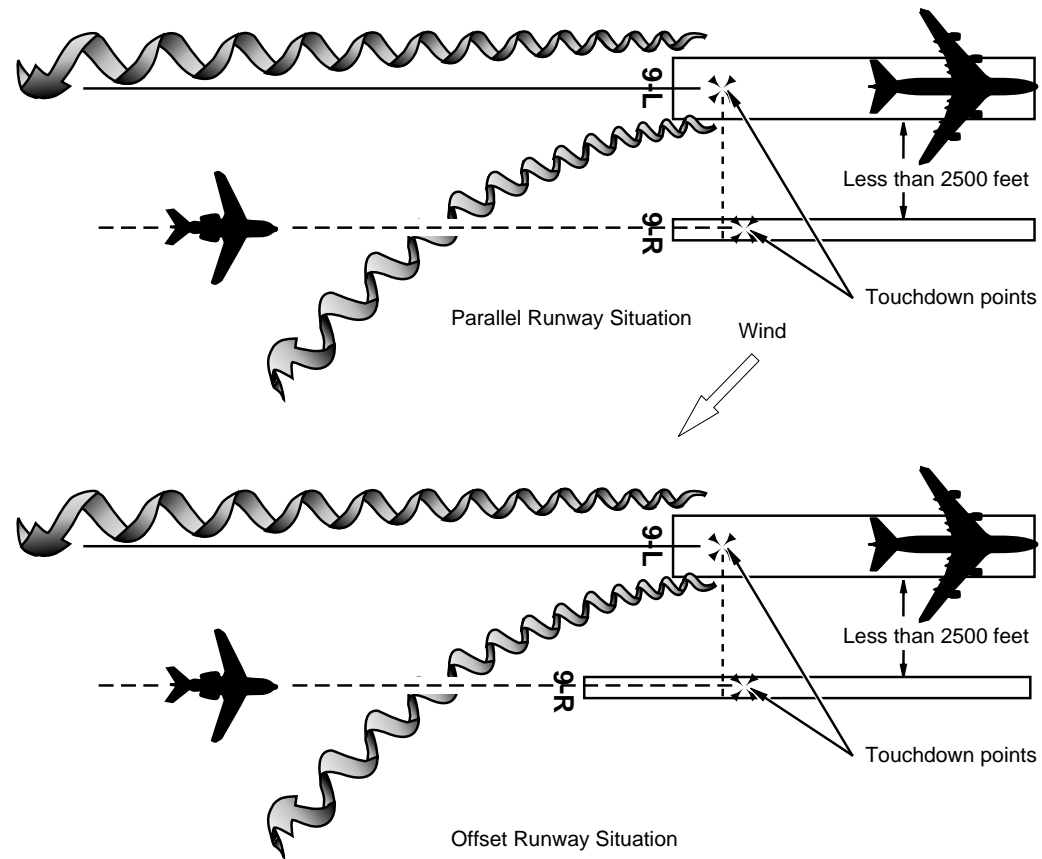
Land beyond the touchdown point if there is enough runway

Figure 16

WAKE TURBULENCE SAFETY BRIEFING

When it is necessary to land behind a larger aircraft that is using a parallel runway located closer than 2500 feet, you should be alert for the possibility that its wake turbulence may drift over to your runway especially if the parallel runways have displaced thresholds. Note its touchdown point, and adjust your touchdown point if necessary. Wake turbulence from flight operations on parallel runways that are more than 2500 feet apart should not be a hazard to your approach and landing.

Avoidance Procedures: Landing



Parallel and Offset Runways Closer Than 2500 Feet:

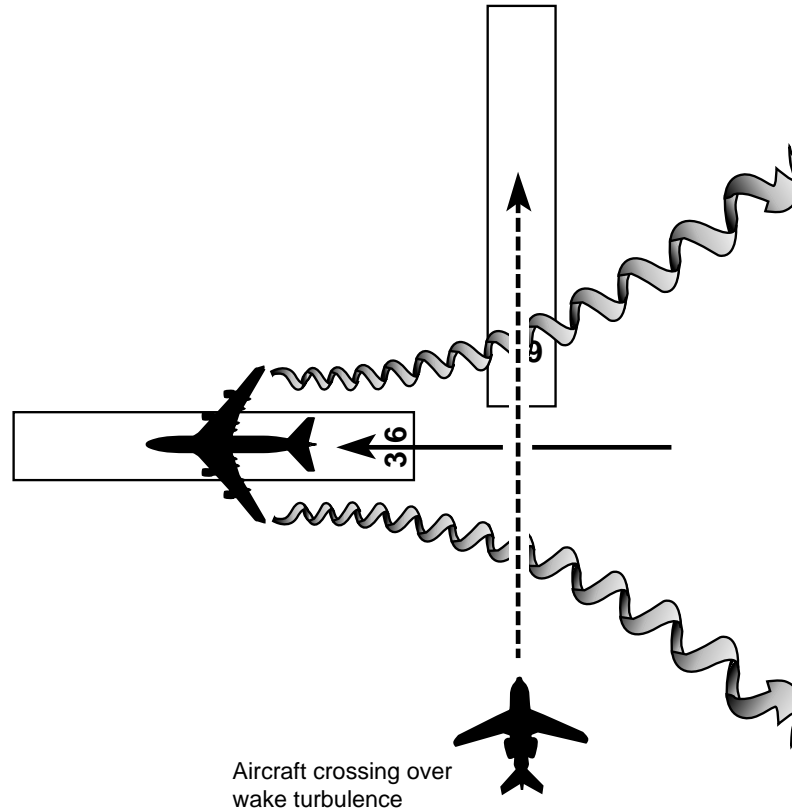
Consider wake turbulence drift over to runway above flightpath
Note touchdown point

Figure 17

WAKE TURBULENCE SAFETY BRIEFING

When landing behind a larger aircraft that is using a crossing runway, it is necessary to cross above its flightpath.

Avoidance Procedures: Landing



Crossing Runway:

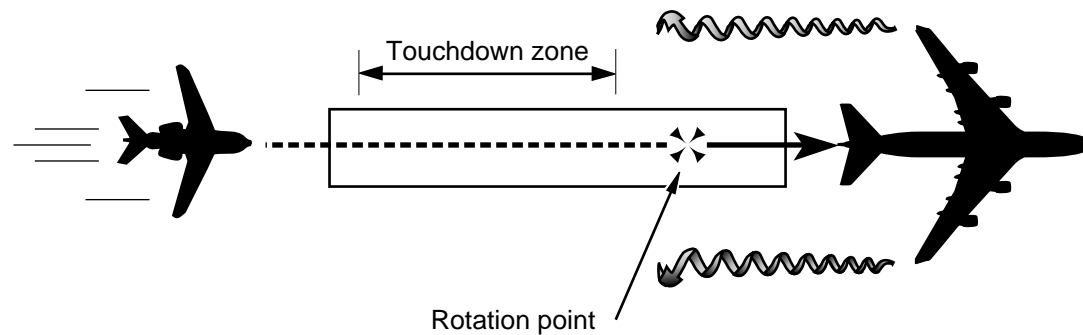
Landing behind a larger aircraft that is using a crossing runway
Cross above the larger aircraft's flightpath

Figure 18

WAKE TURBULENCE SAFETY BRIEFING

When you land on the same runway behind a departing larger aircraft, you should note its rotation point and land well before that point. This is because the departing aircraft will begin producing significant wake turbulence as it lifts off the runway.

Avoidance Procedures: Landing



Same Runway:

Landing behind departing aircraft that is using the same runway

Note rotation point

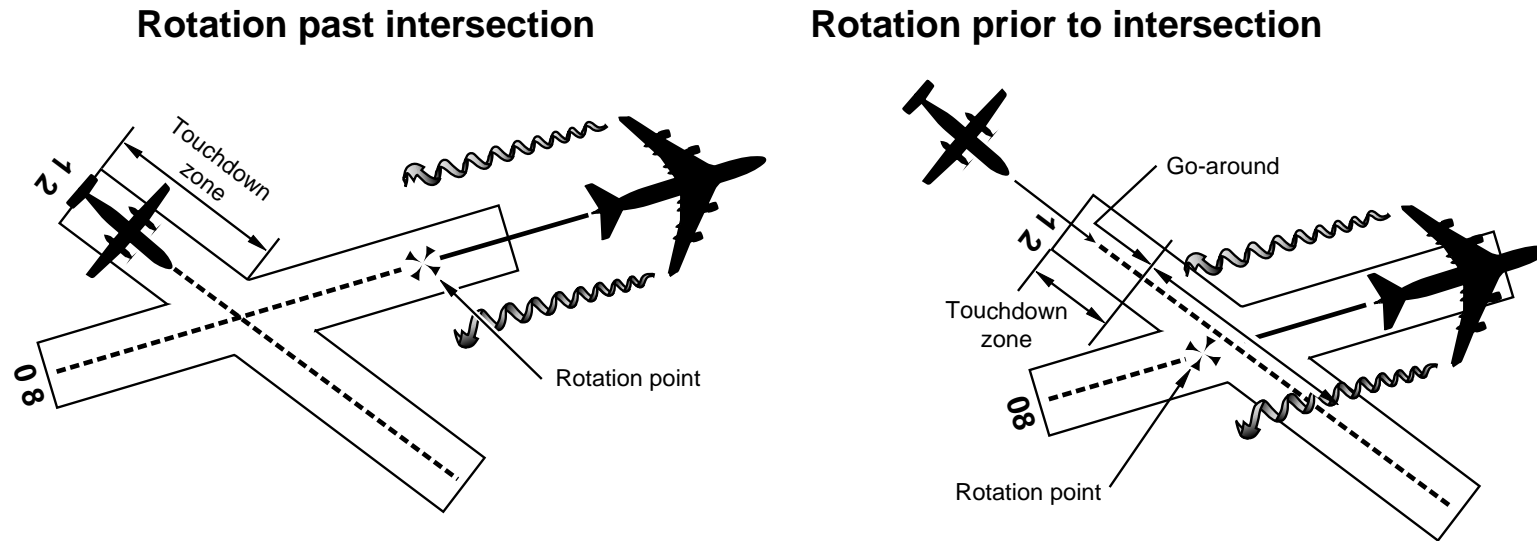
Land prior to rotation point

Figure 19

WAKE TURBULENCE SAFETY BRIEFING

Making a landing behind a departing larger aircraft that is using a crossing runway is a more difficult situation. It is necessary to note the larger aircraft's rotation point and determine if it was past the intersection of the crossing runway. If it was past the intersection, continue your approach and make sure your landing is before that intersection. If the departing larger aircraft rotates before the intersection, avoid flight below its flightpath. Be alert for the possibility that the wake turbulence may drift over to your runway. Abandon your approach unless a landing is assured well before reaching the intersection.

Avoidance Procedures: Landing



Crossing Runway:

Landing behind a departing larger aircraft

Be alert for wake turbulence drift
Note larger aircraft's rotation point

Past the intersection??

Continue approach

Land prior to intersection

Prior to intersection??

Avoid flight below its flightpath

Abandon approach unless landing well prior to intersection

Figure 20

WAKE TURBULENCE SAFETY BRIEFING

There are some critical decisions necessary when you take off behind a larger aircraft. Your aircraft's performance can be a significant factor. Normally, the tower operator will apply appropriate time intervals between departing aircraft.

First, you should note the departing aircraft's rotation point and determine that your rotation will be before that point.

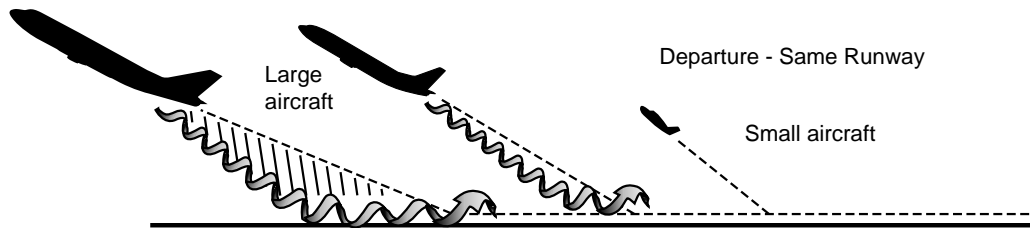
After your takeoff, climb upwind of the larger aircraft and continue to climb above its climb path until turning clear of its wake.

During your departure, be sure and avoid subsequent headings which will require you to cross below and behind the larger aircraft.

Be alert for any critical takeoff situation which could lead to a wake turbulence encounter.

Delaying your takeoff to allow time for generated wake turbulence to dissipate or move away from the runway, should be your first choice in your decision making.

Avoidance Procedures: Takeoff



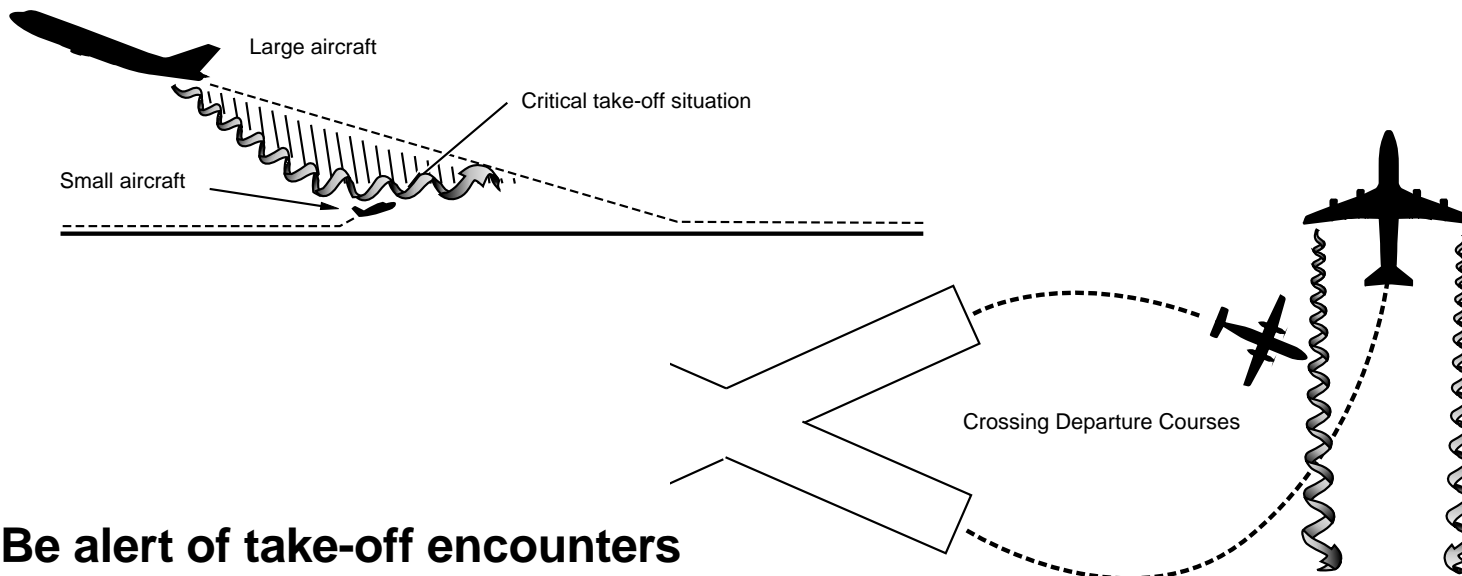
Same runway:

Departing behind a larger aircraft

Note rotation point and rotate before that point

Climb above previous aircraft's climb path before turning

Avoid a heading that will take you behind and below the larger aircraft's path



Be alert of take-off encounters

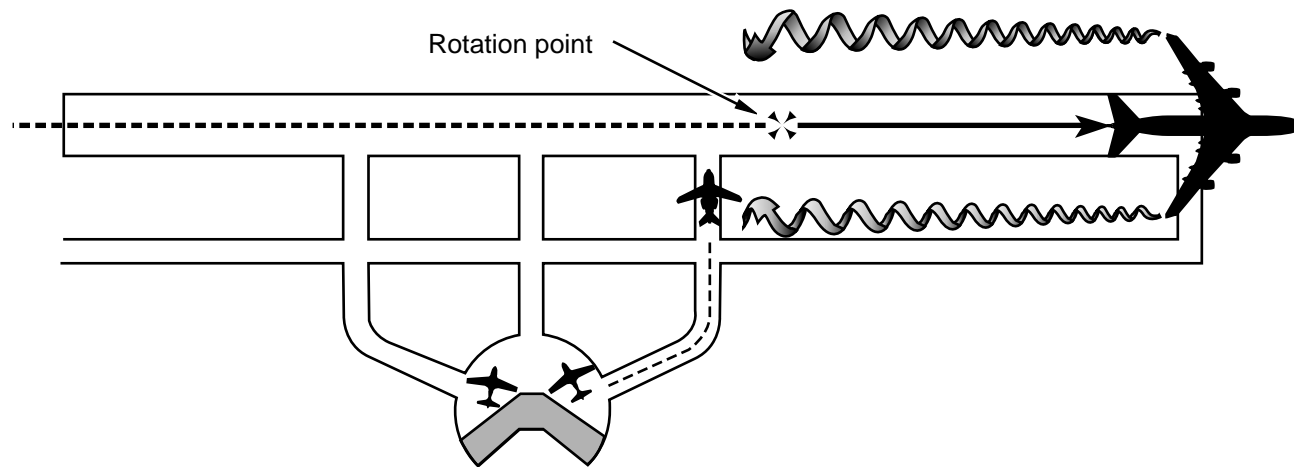
Figure 21

WAKE TURBULENCE SAFETY BRIEFING

Be alert to adjacent larger aircraft operations when you make a takeoff from a runway intersection, particularly those that are upwind of your take-off position.

After takeoff, plan to avoid any subsequent heading which will require you to cross below the larger aircraft's flightpath.

Avoidance Procedures: Takeoff



Intersection takeoff:

Be aware of operations upwind

Avoid headings that will take you below the lead aircraft's flightpath

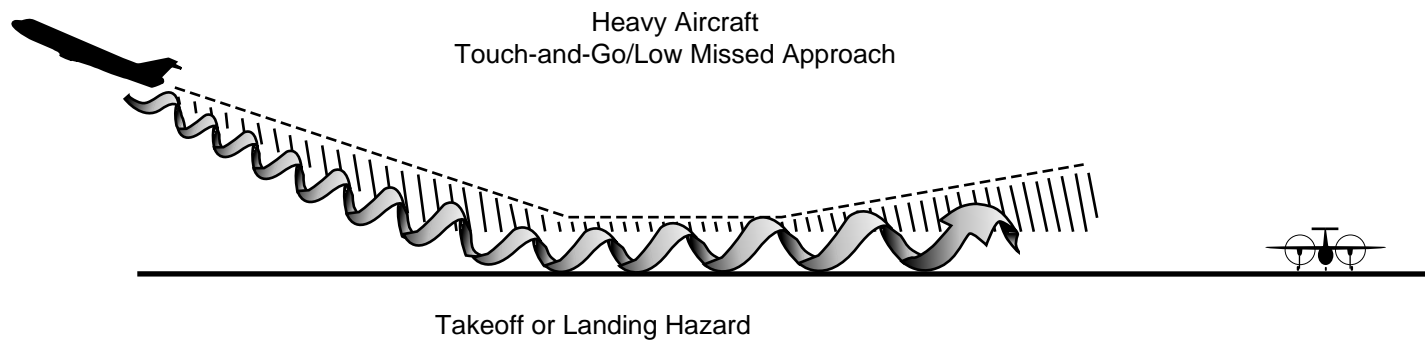
Figure 22

WAKE TURBULENCE SAFETY BRIEFING

Assure that an interval of at least 2 minutes has elapsed before taking off after a heavy aircraft has executed a low approach, missed approach, or touch-and-go landing. This is because the wake turbulence settles and moves laterally near the ground and may exist along the runway and in your flightpath. This is particularly true in light quartering tailwind conditions.

Avoidance Procedures: Takeoff

Wait 2 minutes



Departing takeoff:

Departing after a heavy aircraft's:

low approach

missed approach

touch-and-go

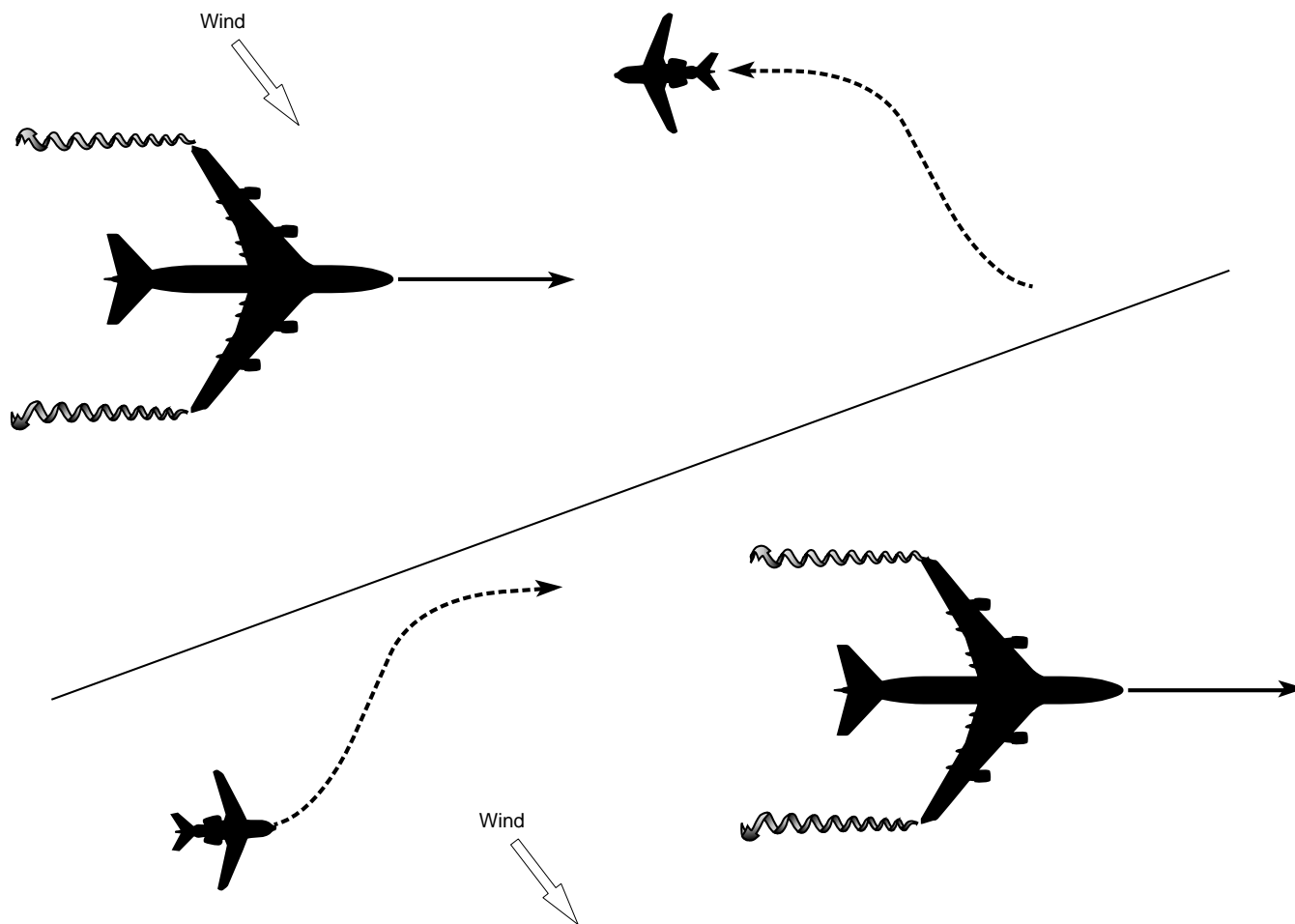
Figure 23

WAKE TURBULENCE SAFETY BRIEFING

For en route VFR situations where the cruise altitude is usually at 1000 foot plus 500 feet, normal logic prevails: Avoid flying behind and below a large aircraft's flightpath.

If you observe a larger aircraft above and on your same track (meeting or overtaking), adjust your position laterally, preferably to the upwind side.

Avoidance: En Route



**Avoid path below larger aircraft
Adjust position upwind - if possible**

Figure 24

WAKE TURBULENCE SAFETY BRIEFING

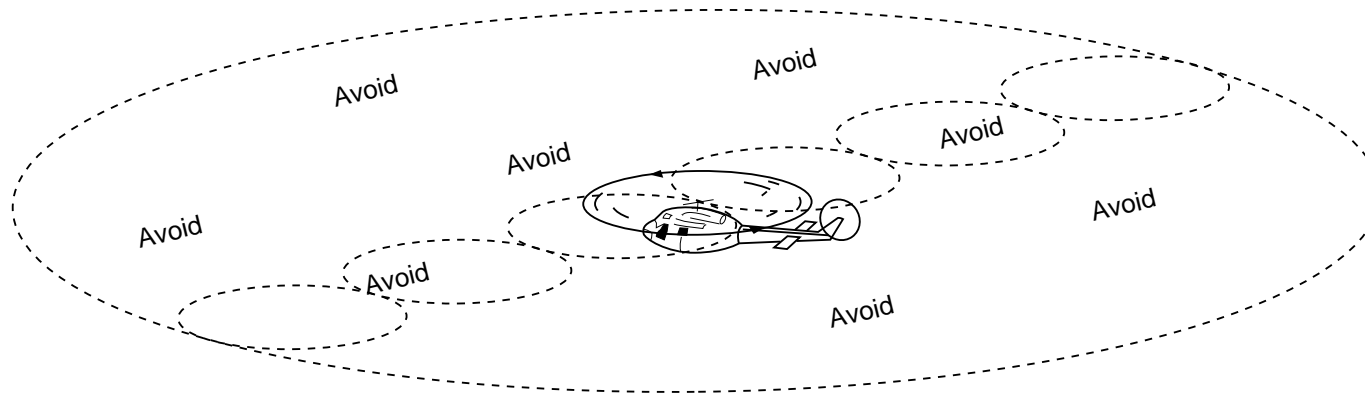
Hovering helicopters produce rotor downwash that turns into outwash when it contacts the surface and moves in all directions. Pilots of small aircraft should avoid operating within a distance equal to 3 times the helicopter rotor diameter.

When a helicopter is operating in forward flight, it produces wake turbulence similar to fixed-wing aircraft. Pilots of small aircraft should use caution when operating behind or crossing behind landing and departing helicopters.

Avoidance Procedures: Helicopter Wake Turbulence

Slow hover taxi or stationary hover

Avoid operations within distances of 3 times rotor diameter



Forward flight, landing and departing helicopters

Small aircraft, use caution behind/crossing behind

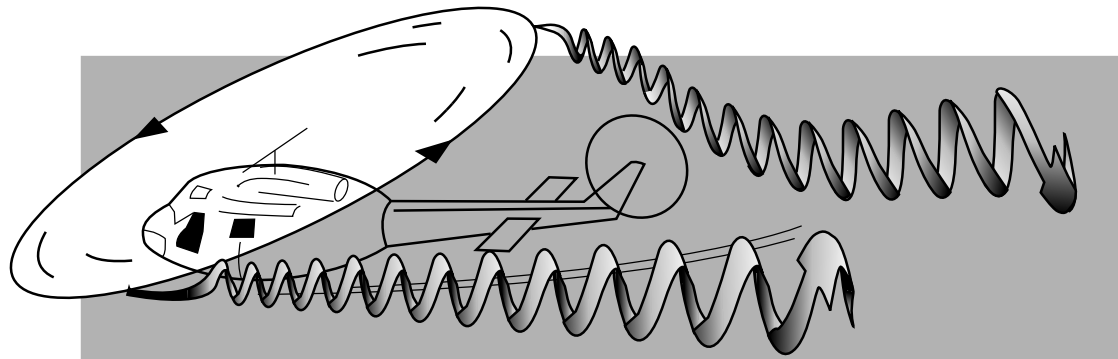


Figure 25

WAKE TURBULENCE SAFETY BRIEFING

Pilots have difficulty in determining the flightpath of other aircraft. The task of maintaining proper visual relationship with a leader aircraft becomes greater and more complicated when aircraft of different sizes and speeds are involved and are approaching from various altitudes and directions.

Do not make an assumption that because a leader aircraft is below you that its flightpath is or was also below you. It is possible the leader aircraft varied its descent rate, especially during the initial portion of its approach.

An ILS glideslope can be a starting point for assistance in determining a leader aircraft's flightpath, but it is not foolproof. In fact, the leader aircraft may have flown above the glideslope for wake-turbulence avoidance or other reasons.

Pilots can experience visual illusions for several reasons:

- Aircraft sizes can make it difficult in judging distances and rates of closure.

- Changing aircraft body attitudes can be confused with a change in flightpath.

Depth perception is inhibited during darkness because you have only the other aircraft's lighting to determine its flightpath.

Reduced weather visibility also makes it difficult in determining another aircraft's flightpath.

Problems in Visually Maintaining Separation

Different aircraft

- Sizes
- Speeds
- Altitudes
- Approach directions

Changing descent rates

- ILS glideslope adjustments

- Visual Illusions

- Darkness

- Reduced visibility weather

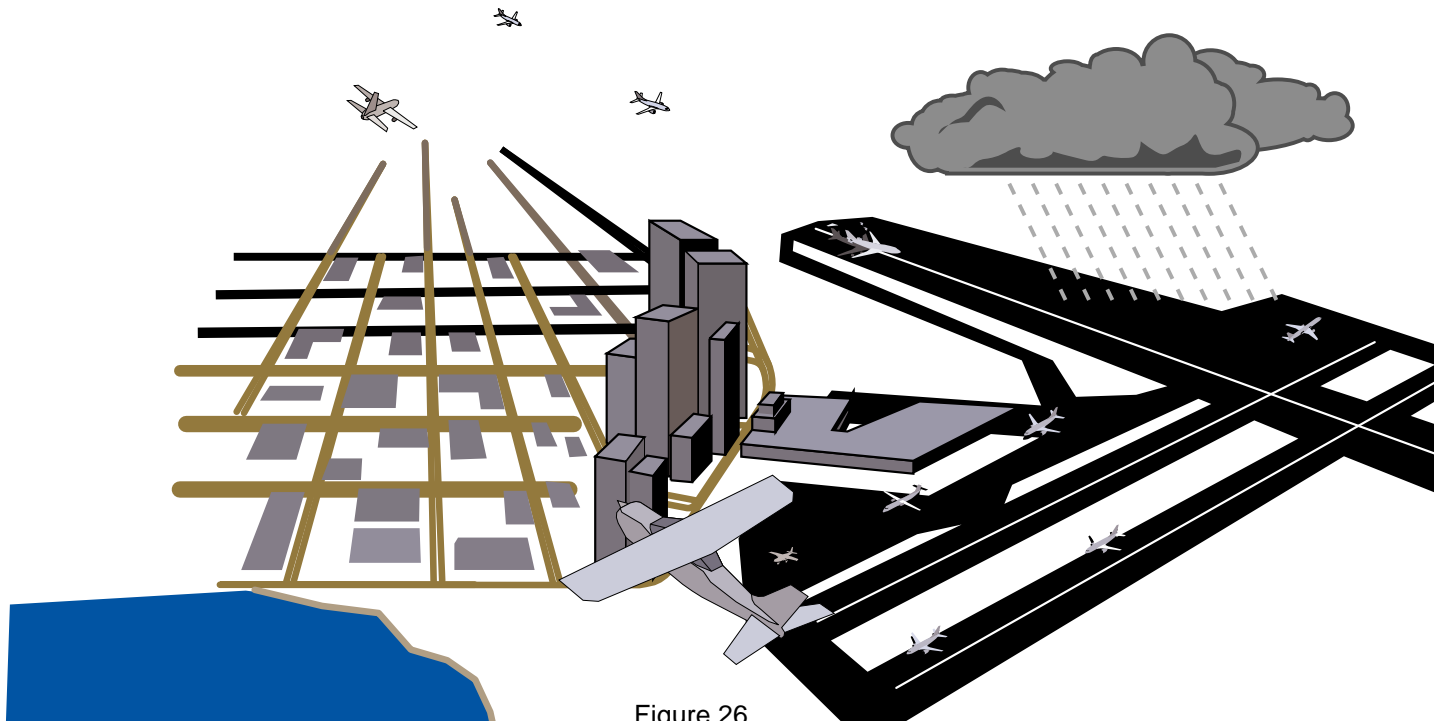


Figure 26

WAKE TURBULENCE SAFETY BRIEFING

Now that we have reviewed the recommended wake-turbulence avoidance procedures, let's look at some techniques available to help you with visually maintaining separation. Remember, the pilot is responsible for maintaining separation from wake turbulence by positioning his/her aircraft vertically, laterally or longitudinally away from the turbulence.

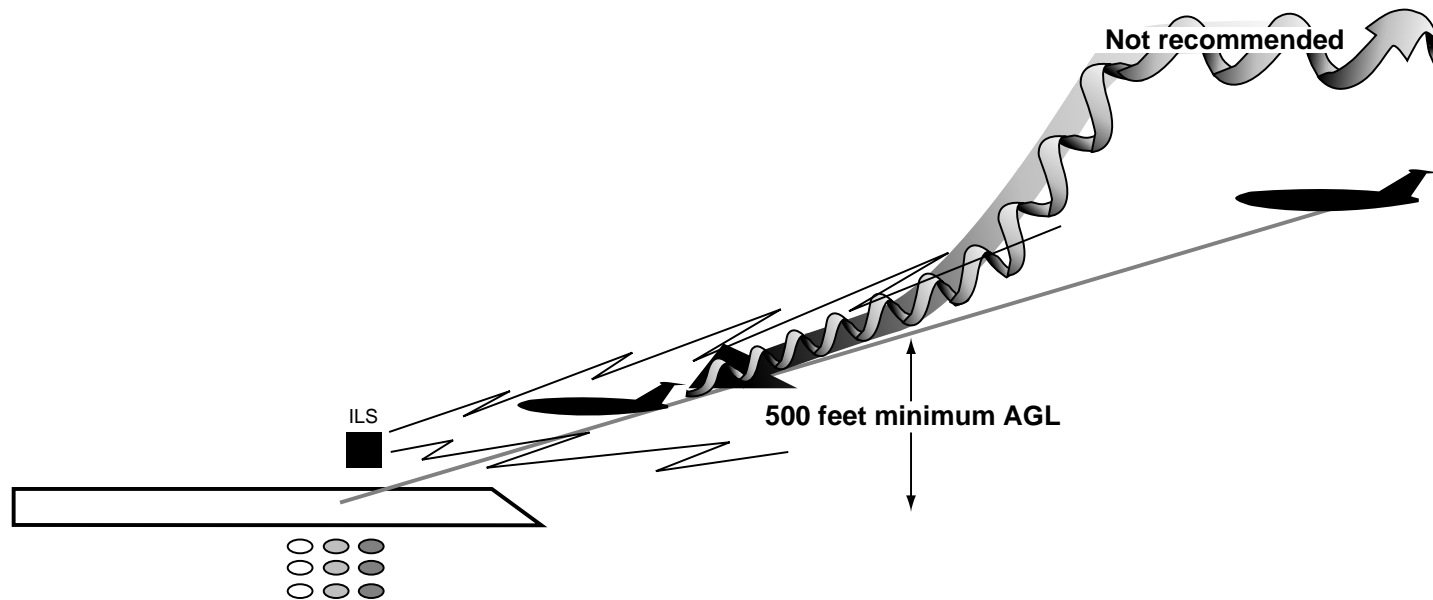
A key in employing many of the recommended visual avoidance procedures is to be aware of a leader aircraft's flightpath. Pilots must make some assumptions on where a leader aircraft has flown. If pilots fly a normal 3-degree flightpath during an approach, it will aid a trailing pilot in judging the flightpath.

Steep descents may have serious ramifications for trailing pilots with regard to wake turbulence.

The use of visual glideslope indicators such as VASI or PAPI or instrument precision approach aid will assist in flying a normal approach flightpath.

The aircraft should be stabilized on the flightpath not lower than 500 feet AGL.

Techniques for Visually Maintaining Separation



Fly normal flightpath:

3-degree flightpath

Stabilize not lower than 500 feet AGL

Use:

- VASI
- PAPI
- Instrument precision approach aids

Figure 27

WAKE TURBULENCE SAFETY BRIEFING

Visual cues are available to help pilots determine a leader aircraft's flightpath.

- Extend an imaginary line from your position to the runway normal touchdown point. If the leader aircraft is above this line, you are below its flightpath. Conversely, if the leader aircraft is on or below the imaginary line, you are on or above its flightpath. This assumes the leader has flown a consistent flightpath and is using a normal runway touchdown point.
- While following an aircraft, extend an imaginary line from your aircraft through the lead aircraft to the runway. It should end at the normal runway touchdown point. If it ends at a point down the runway, the trailing aircraft is probably below the flightpath of the lead aircraft. If the imaginary line extension is before the touchdown point, e.g., in the overrun, the trailing aircraft is probably above the lead aircraft's flightpath.

Techniques for Visually Maintaining Separation

Estimating lead aircraft's flightpath

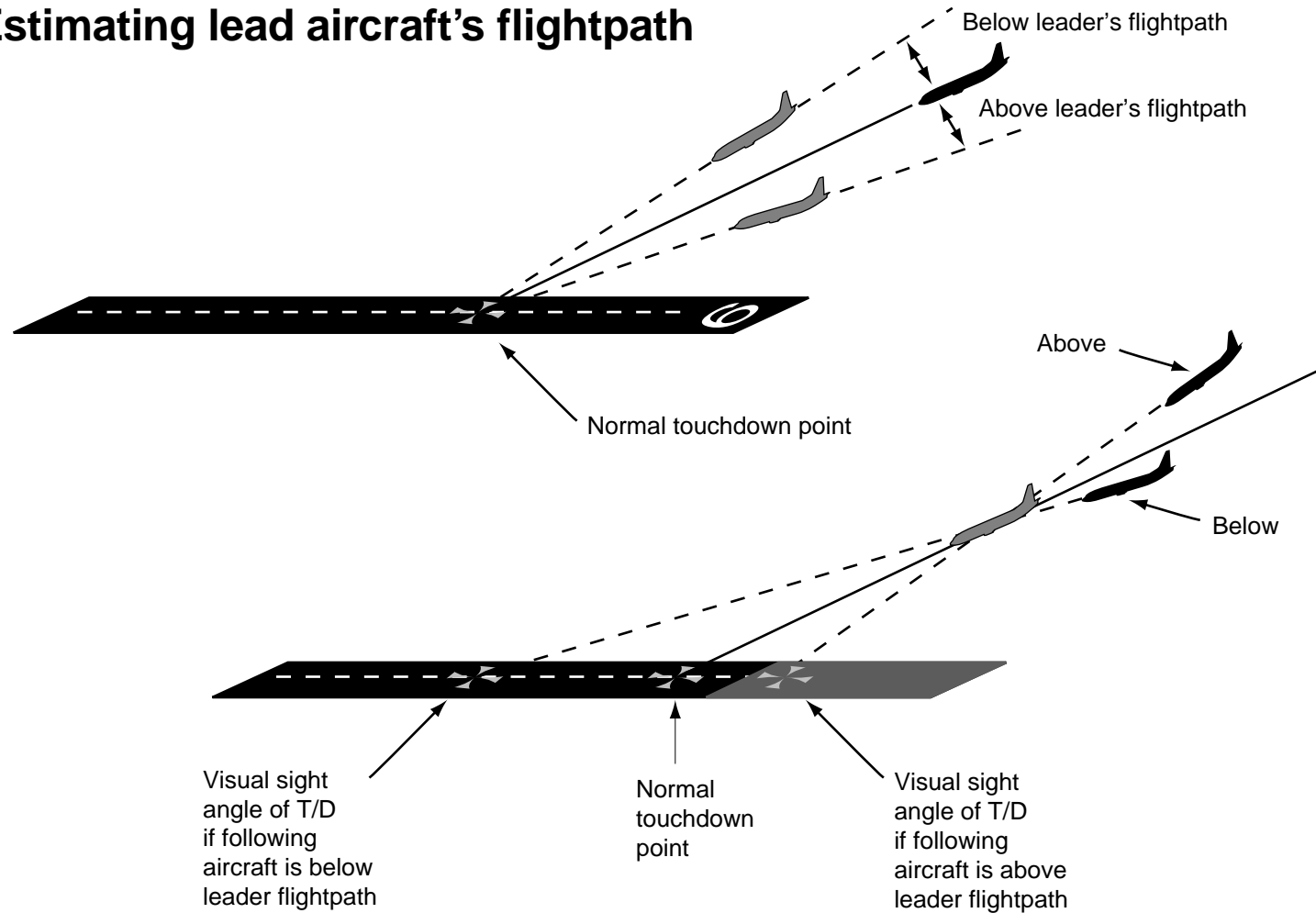


Figure 28

WAKE TURBULENCE SAFETY BRIEFING

When ILS approaches are being used in VFR weather, consideration may be made by the pilot of the trailing aircraft to deviate from the normal glideslope and or localizer to avoid wake turbulence. This assumes that the lead aircraft is on localizer course and glideslope. Be alert! This is not always true.

- One-dot glideslope deviation is only 78 feet from the glideslope at 3 nautical miles. A two-dot deviation is only 156 feet at 3 nautical miles.
- Offsetting upwind one-dot localizer deviation is 573 feet at 3 nautical miles and 1,147 feet for a two-dot deviation.

Techniques for Visually Maintaining Separation

Glidescope

| Miles from touchdown (nm) | 5 | 4 | 3 | 2 | 1 |
|--------------------------------|------|------|------|------|-----|
| One-dot (1/4 degree) deviation | 130' | 104' | 78' | 52' | 26' |
| Two-dot (1/2 degree) deviation | 260' | 208' | 156' | 104' | 52' |

Localizer

| Miles from touchdown (nm) | 5 | 4 | 3 | 2 | 1 |
|----------------------------------|-------|-------|-------|------|------|
| One-dot (1-1/4 degree) deviation | 838' | 706' | 573' | 441' | 308' |
| Two-dot (2-1/2 degree) deviation | 1677' | 1412' | 1147' | 882' | 617' |

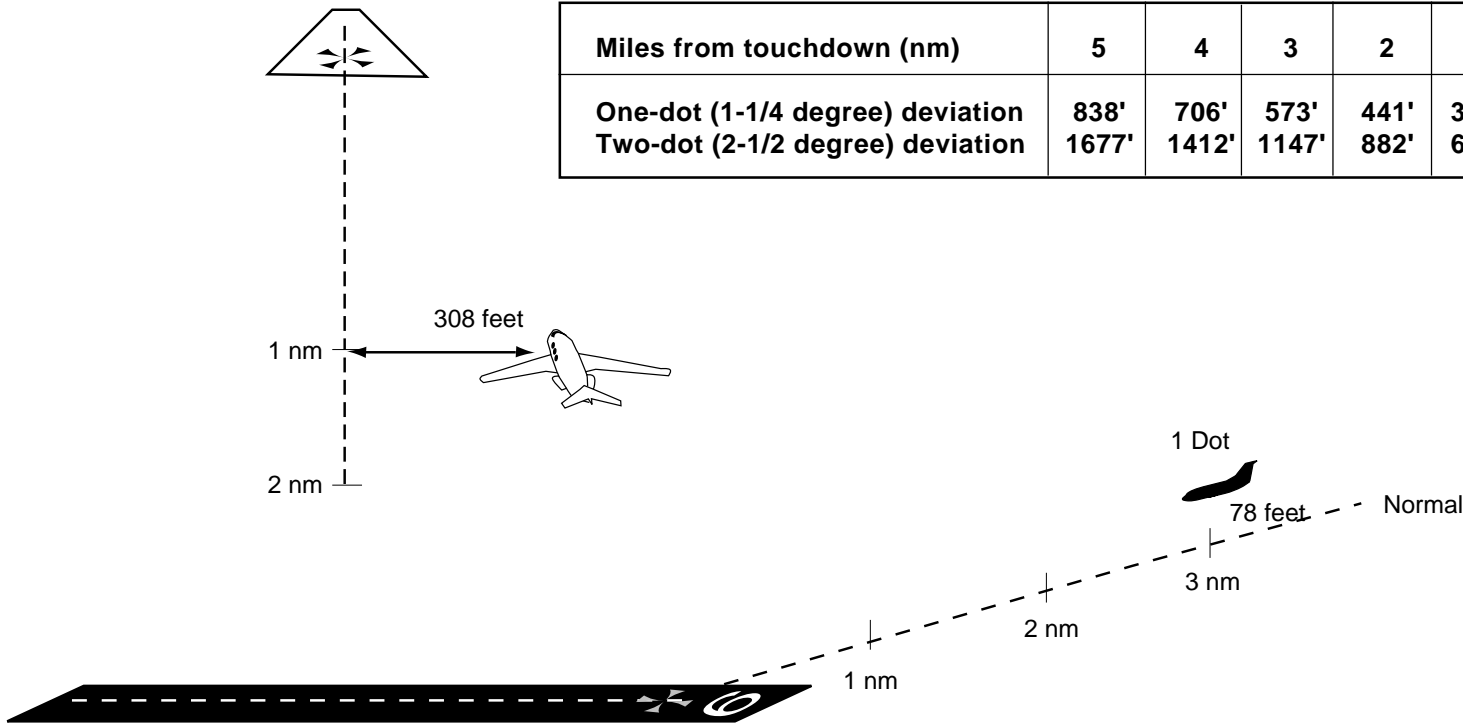


Figure 29

WAKE TURBULENCE SAFETY BRIEFING

Pilots may establish longitudinal separation from aircraft to allow time for the wake turbulence to dissipate or move. Judging in-flight distances can be difficult.

- Air traffic control can assist with distances as well as airspeed differentials.
- Time and distance methods can also be used as aircraft pass over geographical or radio call points. It is helpful to know the distance from the runway to an instrument approach fix or an available landmark.

Several factors such as aircraft performance, in-flight visibility, other aircraft, etc., should be considered when increasing separation distances while established on final approach.

- Reduction of airspeed is usually the first choice for increasing distances. Pilots should not reduce airspeed below the aircraft's minimum safe operating speed. Be aware that recovery from an inadvertent wake-turbulence encounter is more difficult at slower airspeeds. Most transport aircraft final approach speeds are between 120 and 150 knots.
- Execute "S" turns or a 360 degree turn to increase separation.
- A go-around is always an alternative for avoiding wake turbulence.

Techniques for Visually Maintaining Separation

- **Judging distances**
 - ATC provided**
 - Time and distance**
- **Achieving longitudinal separation**
 - Speed reduction**
 - “S” turns**
 - 360s**
- **Go-around**

WAKE TURBULENCE SAFETY BRIEFING

Radio communications (not just those directed to you) can provide pilots with information which can improve wake-turbulence situational awareness. Prior to entering a traffic pattern or initiating an instrument approach, radio transmissions can alert pilots on where they may fit in the landing sequence or what type of aircraft they may follow. Take-off and landing clearances are useful for spacing considerations as well as anticipating the location of generated wake turbulence.

Basic surface wind indications can aid pilots with estimating the movement of wake turbulence. Blowing dust, smoke, and wakes on lakes and ponds are indicators of wind movement and can be applied to wake-turbulence movement. On-board avionics equipment, i.e., inertial reference, Doppler radar, and global positioning system (GPS) provide wind information. Observed aircraft drift angles will also give clues in determining wind direction.

Techniques for Maintaining Separation

Situational awareness:

Radio transmissions

Wake turbulence movement indicators

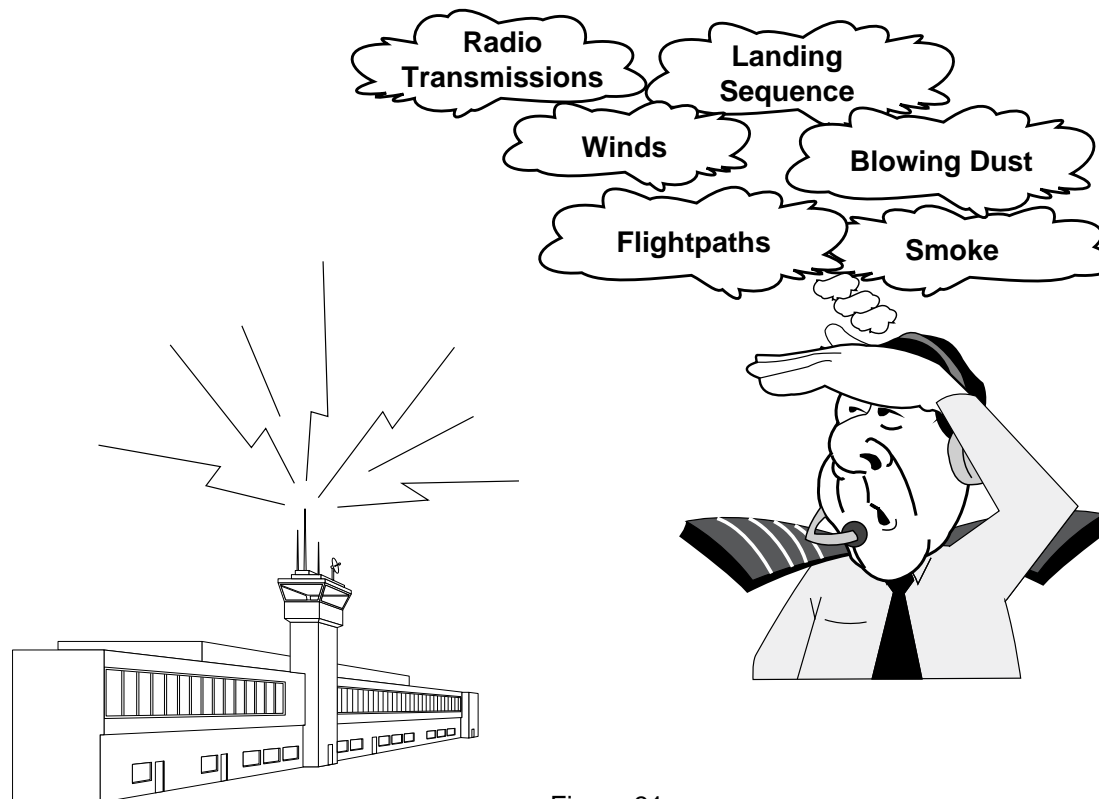


Figure 31

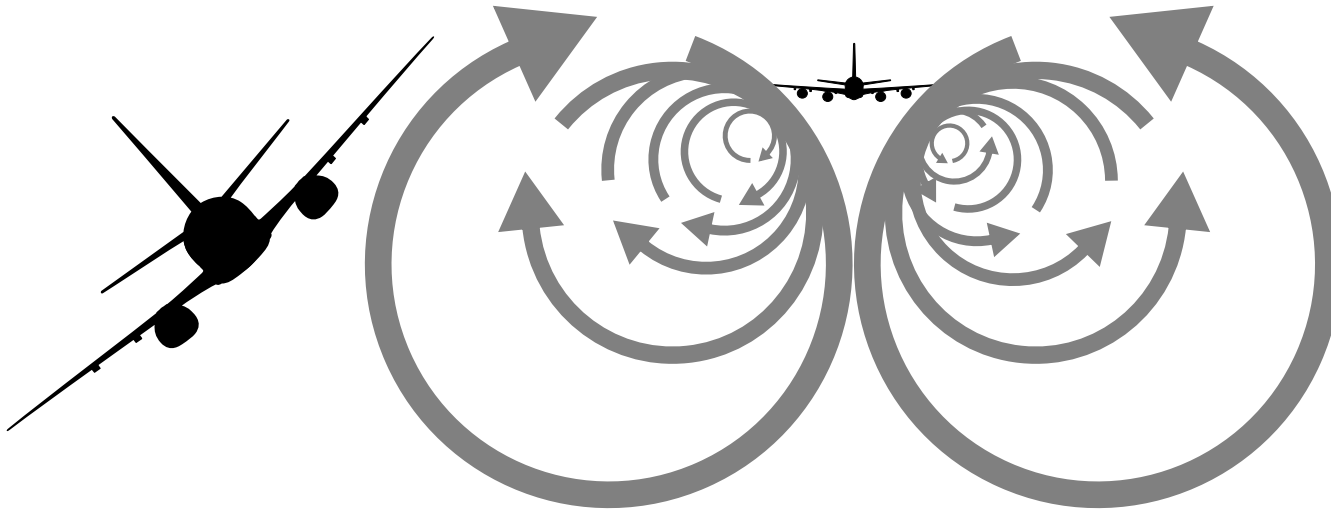
WAKE TURBULENCE SAFETY BRIEFING

An encounter with wake turbulence usually results with induced rolling or pitch moments; however, in rare instances, an encounter could cause catastrophic in-flight structural aircraft damage. With all encounters, without a concerted effort by the pilot, the aircraft will be expelled from the wake.

Counter control is usually effective and induced roll is minimal in cases where the wingspan and ailerons of the encountering aircraft extend beyond the rotational flow field of the vortex. It is more difficult for aircraft with short wingspans (relative to the generating aircraft) to counter induced roll.

It may be difficult or impossible for pilots to differentiate between wake turbulence and turbulence generated from another source (like windshear). Pilots should analyze the conditions in which they encounter turbulence in order to determine if it was wake turbulence and apply appropriate procedures if wake turbulence is suspected to be present. An inadvertent encounter at low altitude is much more hazardous than an encounter at cruise altitude or early during the approach phase of flight.

Pilot Response If Wake Turbulence Encountered



- **Short wingspan increases difficulty of countering induced roll**
- **Difficult to determine wake turbulence from windshear/normal turbulence**
- **Low-altitude encounter extremely hazardous**

Figure 32

WAKE TURBULENCE SAFETY BRIEFING

Air Traffic Control is responsible for the safe, orderly, and expeditious flow of all aircraft in their area of responsibility. A controller's ability to do this is affected by several considerations in addition to wake turbulence.

Weather conditions determine separation considerations. Visual conditions provide advantages to better service.

More aircraft can land and take off if the weather is VFR and visual approaches are used. Separations will be approximately 1-1/2 miles between landing and arriving aircraft. Under IFR weather conditions, a minimum separation of 2-1/2 miles is required inside the final approach fix. If wake-turbulence separation is required, the separation can extend to 6 nautical miles. Visual conditions and visual separation allow controllers to handle more aircraft within the system. When a pilot takes responsibility for aircraft separation, the controllers can concentrate their efforts on the remaining IFR aircraft.

The following wake-turbulence factors should be considered (if appropriate) when clearing a pilot to maintain visual separation or approach:

| | |
|----------------------|--|
| Winds | Place smaller aircraft upwind of larger aircraft when possible |
| Relative airspeeds | Consider the impact of closure |
| Intersecting runways | Anticipate the effect on future flightpath situations |
| Aircraft departures | Consider the effect or a go-around of arriving aircraft |
| Relative flightpaths | Do not vector aircraft below leading aircraft |
| | Avoid steep aircraft descent situations |

Air Traffic Control Considerations

Cleared for the visual!

Winds

Relative airspeeds

Intersecting runways

Aircraft departures

Relative flightpaths

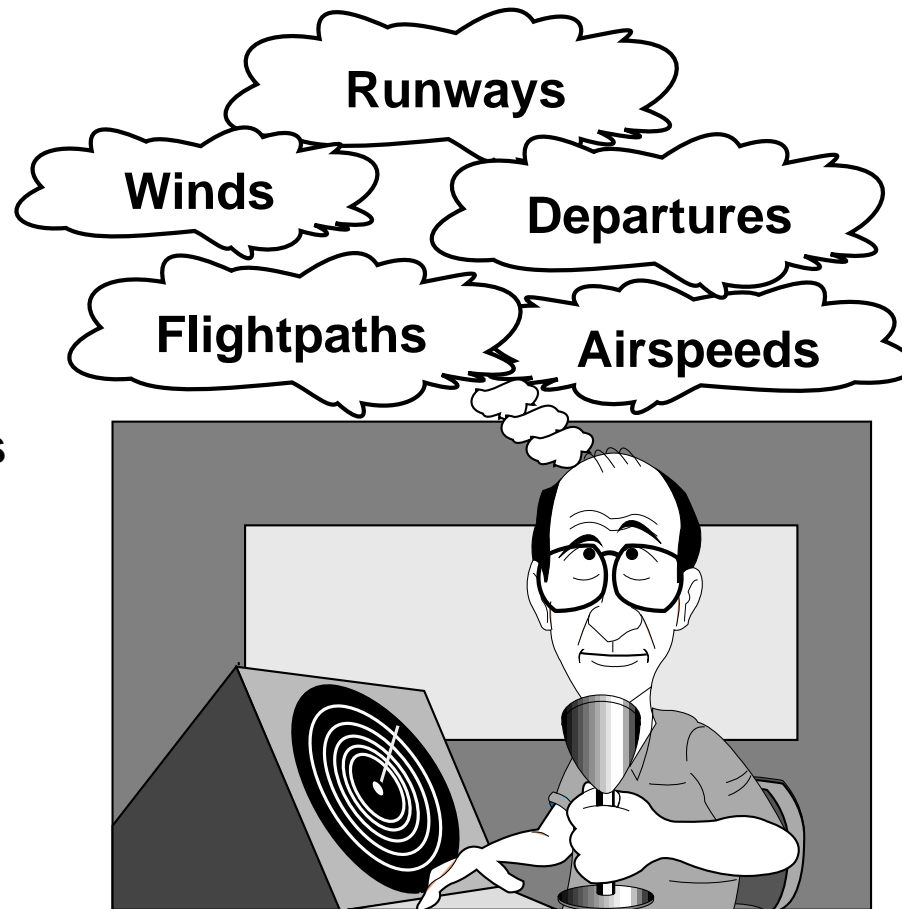


Figure 33

WAKE TURBULENCE SAFETY BRIEFING

Since wake turbulence is formed when aircraft lift is produced, the potential for aircraft accidents and incidents will always be present. The potential doesn't have to become a reality if we understand what it is, what it does, and what our responsibilities are associated with in avoiding it. Wake turbulence is one of several aviation hazards that can be avoided by applying recommended procedures and using various techniques when implementing the procedures. It requires the effort by both air traffic controllers and pilots working together as a team to prevent wake-turbulence encounters.

Pilots and Air Traffic Controllers

Can Prevent Wake-Turbulence Encounters

by Working Together



Figure 34

WAKE TURBULENCE SAFETY BRIEFING

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